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| EXAMINER |
|---|
| ODOM, CURTIS B |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2634 | 15 |

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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/446,560 | ABETA ET AL. | |
| | Examiner | Art Unit | |
| | Curtis B. Odom | 2634 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *07 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-8 and 12-19* is/are rejected.

7)☐ Claim(s) *2-4 and 9-11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 December 1999 and 04 February 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments, see Amendment D, filed 1/7/04, with respect to the rejection(s)of claim(s) 1-19 under 35 USC 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Eberhardt et al. (U. S. Patent No. 5, 930, 288).

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 5-8, and 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eberhardt et al. (U. S. Patent No. 5, 930, 288) in view of Shimzu et al. (previously cited in Office Action 10/7/03).

Regarding claim 1, Eberhardt et al. discloses a receiver for receiving and demodulating a signal (Fig.1) including a combined symbol sequence that has a plurality of slots and includes data symbols and pilot symbols (column 4, lines 46-55), the receiver comprising:

means for detecting positions of the pilot symbols in the combined symbol sequence (Fig. 1, blocks 150 and 151, column 5, lines 36-47);

means for generating pilot blocks by extracting in a plurality of slots the pilot symbols from the combined symbol sequence in response to a result of the detection (Fig. 3, block 302, column 9, lines 17-35), wherein a symbol group is a pilot block;

means for obtaining channel estimation values by calculating a weighted sum of average values of the pilot symbols in the pilot blocks (Fig. 3, block 300, column 10, lines 17-28);

means for acquiring from the combined symbol sequence a data symbol sequence in accordance with the result of the detection (Fig. 1, blocks 150 and 158, column 6, lines 11-20); and

means for compensating for channel fluctuations of the data symbol sequence using the channel estimation values (Fig. 1, blocks 156 and 164, column 6, lines 3-47), wherein multiplying the data symbol sequence by the complex conjugate of estimated channel gain and channel phase (channel estimations produced by the filter) compensates for channel fluctuations of the data symbol sequence.

Eberhardt et al. does not disclose means for controlling the weighting in response to a rate of the channel fluctuations.

However, Shimizu et al. discloses a receiver for receiving and demodulating a signal comprising of channel estimators which obtain channel estimations based on pilot symbols (Fig. 3, block 27, column 6, lines 28-39). Shimizu et al. also discloses the weighting of the channel estimation values in controlled in response to channel fluctuations (column 1, line 50-column 2, line 8 and column 6, line 48-column 7, line 9, wherein the rate of channel fading is a rate of channel fluctuations). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the receiver of Eberhardt et al. with the teachings

of Shimizu et al. because being able to measure and use the received channel fluctuations to weight the pilot symbols allows the receiver to cancel the channel fluctuations from the received symbols due to fading and interference with more accuracy. This allows for a more accurate recovery of the received symbols.

Regarding claim 5, which inherits the limitations of claim 1, Eberhardt et al. does not disclose the receiver receives a signal including a combined symbol sequence having a frame structure consisting of slots in which the pilot symbols consisting of a few symbols are inserted into the data symbol sequence at every fixed interval. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since the receiver (Fig. 1) of Eberhardt et al. receives a received signal containing both both pilot symbols and data symbols that the symbols could have been arranged in the frame structure described above at the transmitter. Thus, creating a signal for reception including a combined symbol sequence having a frame structure consisting of slots in which the pilot symbols consisting of a few symbols are inserted into the data symbol sequence at every fixed interval is deemed a design choice and does not constitute patentability.

Regarding claim 6, which inherits the limitations of claim 1, Eberhardt et al. does disclose forming a symbol group (Fig. 3, block 302, column 9, lines 17-35), wherein the symbol group can be considered a pilot symbol block. Eberhardt et al. does not disclose pilot blocks are formed from all the pilot symbols in a slot. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the pilot symbols could have been transmitted in slots created at the transmitter and the symbols in each slot would form a group as

disclosed by Eberhardt et al. Thus, transmitting symbols in a slot is deemed a design choice and does not constitute patentability.

Regarding claim 7, which inherits the limitations of claim 1, Eberhardt et al. further discloses obtaining a channel estimation value of a data symbol in a combined symbol sequence (column 9, lines 17-28). Eberhardt et al. does not disclose when obtaining the channel estimation value of a data symbol in an n-th slot of the combined symbol sequence, where n is an integer, the pilot blocks are generated from an (n-K+1)-th slot to an (n+K)-th slot of the combined symbol sequence, where K is a natural number (Fig. 3 and column 2, lines 55-63), wherein the pilot blocks are generated from an (n-K+1)-th slot to an (n+K)-th slot of the combined symbol sequence, where K is a natural number. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since the receiver (Fig. 1) of Eberhardt et al. receives a received signal containing both both pilot symbols and data symbols that the symbols could have been arranged in the frame structure described above at the transmitter. Thus, creating a signal for reception including a combined symbol sequence having a frame structure consisting of slots in which the pilot symbols consisting of a few symbols are inserted into the data symbol sequence at every fixed interval is deemed a design choice and does not constitute patentability.

Regarding claim 8, Eberhardt et al. discloses a receiver for receiving and demodulating a signal including a data symbol sequence and a pilot symbol sequence parallel to the data symbol sequence (Fig. 1), the receiver comprising:

means for generating a plurality of pilot blocks from the pilot symbol sequence (Fig. 1, blocks 150 and 151, column 5, lines 36-47);

means for obtaining channel estimation values by calculating a weighted sum of average values of the pilot symbols in the pilot blocks (Fig. 3, block 300, column 10, lines 17-28); and

means for compensating for channel fluctuations of the data symbol sequence using the channel estimation values (Fig. 1, blocks 156 and 164, column 6, lines 3-47), wherein multiplying the data symbol sequence by the complex conjugate of estimated channel gain and channel phase (channel estimations produced by the filter) compensates for channel fluctuations of the data symbol sequence.

Eberhardt et al. does not disclose means for controlling the weighting in response to a rate of the channel fluctuations.

However, Shimizu et al. discloses a receiver for receiving and demodulating a signal comprising of channel estimators which obtain channel estimations based on pilot symbols (Fig. 3, block 27, column 6, lines 28-39). Shimizu et al. also discloses the weighting of the channel estimation values in controlled in response to channel fluctuations (column 1, line 50-column 2, line 8 and column 6, line 48-column 7, line 9, wherein the rate of channel fading is a rate of channel fluctuations). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the receiver of Eberhardt et al. with the teachings of Shimizu et al. because being able to measure and use the received channel fluctuations to weight the pilot symbols allows the receiver to cancel the channel fluctuations from the received symbols due to fading and interference with more accuracy. This allows for a more accurate recovery of the received symbols.

Regarding claim 12, which inherits the limitations of claim 8, Eberhardt et al. further discloses the receiver receives a signal including a data symbol sequence which is spread using a

first spreading code, and a pilot symbol sequence which is parallel to the data symbol sequence and spread using a second spreading code, the first spreading code and the second spreading code being orthogonal to each other (column 5, lines 36-47 and column 6, lines 11-20), wherein the different Walsh spreading codes are orthogonal to each other.

Regarding claim 13, which inherits the limitations of claim 8, Eberhardt et al. does not disclose the receiver receives a signal including a spread data symbol sequence which is impressed on a first carrier, and a spread pilot symbol sequence which is parallel to the data symbol sequence and is impressed on a second carrier, the first carrier and the second carrier being orthogonal to each other. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since the receiver (Fig. 1) of Eberhardt et al. receives a received signals containing both pilot symbols and data symbols that signals could been impressed on two different orthogonal carriers at the transmitter for transmission. Thus, how a signal is modulated for transmission is deemed a design choice and does not constitute patentability.

Regarding claim 14, which inherits the limitations of claim 18, Eberhardt et al. further discloses obtaining a channel estimation value of a data symbol in a combined symbol sequence (column 9, lines 17-28). Eberhardt et al. does not disclose when obtaining the channel estimation value of an n-th data symbol in the data symbol sequence, where n is an integer, the plurality of pilot blocks are generated from an (nK+1)-th pilot symbol to an (n+K)-th pilot symbol in the pilot symbol sequence, where K is a natural number. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that since the receiver (Fig. 1) of Eberhardt et al. receives a received signal containing both both pilot symbols

and data symbols that the symbols could have been arranged in the frame structure described above at the transmitter. Thus, creating a signal for reception including a combined symbol sequence having a frame structure consisting of slots in which the pilot symbols consisting of a few symbols are inserted into the data symbol sequence at every fixed interval is deemed a design choice and does not constitute patentability.

Regarding claim 15, which inherits the limitations of claim 8, Eberhardt et al. discloses the plurality of pilot blocks have the same lengths (column 9, lines 16-35), wherein the symbol group is a pilot block and the length is 42.

Regarding claim 16, Eberhardt et al. discloses a transceiver including a transmitting section for transmitting (column 4, lines 46-64, wherein the base stations and mobile stations can include transmitters and receivers) a signal including a combined symbol sequence that has a plurality of slots and includes data symbols and pilot symbols and a receiving section (Fig. 1) for receiving and demodulating the signal, the receiving section comprising:

means for detecting positions of the pilot symbols in the combined symbol sequence (Fig. 1, blocks 150 and 151, column 5, lines 36-47);

means for generating pilot blocks by extracting in a plurality of slots the pilot symbols from the combined symbol sequence in response to a result of the detection (Fig. 3, block 302, column 9, lines 17-35), wherein a symbol group is a pilot block;

means for obtaining channel estimation values by calculating a weighted sum of average values of the pilot symbols in the pilot blocks (Fig. 3, block 300, column 10, lines 17-28);

means for acquiring from the combined symbol sequence a data symbol sequence in accordance with the result of the detection (Fig. 1, blocks 150 and 158, column 6, lines 11-20); and

means for compensating for channel fluctuations of the data symbol sequence using the channel estimation values (Fig. 1, blocks 156 and 164, column 6, lines 3-47), wherein multiplying the data symbol sequence by the complex conjugate of estimated channel gain and channel phase (channel estimations produced by the filter) compensates for channel fluctuations of the data symbol sequence.

Eberhardt et al. does not disclose means for controlling the weighting in response to a rate of the channel fluctuations.

However, Shimizu et al. discloses a receiver for receiving and demodulating a signal comprising of channel estimators which obtain channel estimations based on pilot symbols (Fig. 3, block 27, column 6, lines 28-39). Shimizu et al. also discloses the weighting of the channel estimation values in controlled in response to channel fluctuations (column 1, line 50-column 2, line 8 and column 6, line 48-column 7, line 9, wherein the rate of channel fading is a rate of channel fluctuations). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the receiver of Eberhardt et al. with the teachings of Shimizu et al. because being able to measure and use the received channel fluctuations to weight the pilot symbols allows the receiver to cancel the channel fluctuations from the received symbols due to fading and interference with more accuracy. This allows for a more accurate recovery of the received symbols.

Regarding claim 17, Sawahashi et al discloses a transceiver including a transmitting section for transmitting a signal including a data symbol sequence and a pilot symbol sequence parallel to the data symbol sequence (column 4, lines 46-64, wherein the base stations and mobile stations can include transmitters and receivers), and a receiving section (Fig. 1) for receiving and demodulating the signal, the receiving section comprising:

means for generating a plurality of pilot blocks from the pilot symbol sequence (Fig. 1, blocks 150 and 151, column 5, lines 36-47);

means for obtaining channel estimation values by calculating a weighted sum of average values of the pilot symbols in the pilot blocks (Fig. 3, block 300, column 10, lines 17-28); and

means for compensating for channel fluctuations of the data symbol sequence using the channel estimation values (Fig. 1, blocks 156 and 164, column 6, lines 3-47), wherein multiplying the data symbol sequence by the complex conjugate of estimated channel gain and channel phase (channel estimations produced by the filter) compensates for channel fluctuations of the data symbol sequence.

Eberhardt et al. does not disclose means for controlling the weighting in response to a rate of the channel fluctuations.

However, Shimizu et al. discloses a receiver for receiving and demodulating a signal comprising of channel estimators which obtain channel estimations based on pilot symbols (Fig. 3, block 27, column 6, lines 28-39). Shimizu et al. also discloses the weighting of the channel estimation values in controlled in response to channel fluctuations (column 1, line 50-column 2, line 8 and column 6, line 48-column 7, line 9, wherein the rate of channel fading is a rate of channel fluctuations). Therefore, it would have been obvious to one of ordinary skill in the art

at the time the invention was made to modify the receiver of Eberhardt et al. with the teachings of Shimizu et al. because being able to measure and use the received channel fluctuations to weight the pilot symbols allows the receiver to cancel the channel fluctuations from the received symbols due to fading and interference with more accuracy. This allows for a more accurate recovery of the received symbols.

Regarding claims 18 and 19, the methods include features corresponding to subject matter mentioned in the above rejection of claims 1 and 8 which is applicable hereto.

## *Allowable Subject Matter*

4. Claims 2-4, and 9-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

## *Conclusion*

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 703-305-4097. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Curtis Odom
March 29, 2004

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